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March 8, 1994

Mr. Chris Pfahl
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P.O. Box 440
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Ms. Phyllis Flack
ARCO
307 E. Park, Suite 400
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Dear Chris and Phyllis:

RE: Upper Blackfoot Mining Complex (UBMC)
1994 Voluntary Interim Remedial Actions
Work Plan Comments
Anaconda and Mike Horse Mine Waste Materials
Anaconda and Mike Horse Mine Adit Discharges

The comments in this letter refer to the UBMC Anaconda and Mike Horse Mine Waste Materials Identification of Remedial Actions and Work Plan for Implementation of Remedial Action and the UBMC Anaconda Mine and Mike Horse Mine Adit Discharges Identification of Remedial Actions and Work Plan for Implementation of Remedial Action submitted by ASARCO and ARCO on February 1, 1994.

These comments are provided to assist ASARCO/ARCO in the design and implementation of their proposed actions. These comments are technical in nature and have not undergone MDHES' legal review. Because ASARCO/ARCO's 1994 interim remedial actions at the UBMC are voluntary, MDHES cannot verify compliance with CECRA standards and cannot provide approval of the actions. As noted in our May 26, 1993 letter, MDHES reserves and retains all of its legal authorities to take future action at the UBMC.

Because the Mike Horse treatability pond is a critical component of the 1994 voluntary interim remedial actions and because ASARCO and ARCO did not respond to MDHES's October 20, 1993 comments on this feature, a copy these comments is enclosed for reconsideration. As this structure has not been completed yet, ASARCO and ARCO could implement MDHES' comments if desired.

The following comments pertain to the **Anaconda and Mike Horse Mine Waste Materials Identification of Remedial Actions and Work Plan For Implementation of Remedial Action:**

Specific Comments:

P. 5-8, Section 5.2. CECRA requires permanent remedies. In comments submitted to ASARCO/ARCO in October 1993 (copy attached), MDHES recommended removal of the treatability pond after the treatability tests were complete (estimated to be 3 years).

P. 5-9, Section 5.2. The fact that the State and community review and comment on the remedial alternatives chosen by ASARCO and ARCO does **not** imply that the State or community accepts the chosen alternative. ASARCO/ARCO have evaluated and chosen remedial alternatives without MDHES approval.

P. 6-3, Section 6.2.2. Placement of a wetland treatment cell upon the area where the Anaconda wastes are removed has nothing to do with applicability of analytical action levels. Analytical analysis should be completed on the material left in-place after the waste removal.

P. 6-5, Section 6.2.4.1. The Soil Conservation Service (SCS) now recommends a type IA storm distribution for areas west of the Continental Divide in Montana. A type II SCS distribution was applied in this study. Although a watershed response will probably not be dramatically different if a type IA is used, it is recommended that the computer analyses be re-run for increased accuracy.

The analysis presented in this section utilizes a 24-hour storm duration. However, classical hydrologic analysis suggests that the proper duration is the one which is equal to the time to concentration of the watershed, which in this case is probably less than 24 hours. As intensity and duration are inversely proportional, use of a shorter duration will undoubtedly lead to a higher expected peak flow rate. Procedures for determining time to concentration are available in SCS and Corp of Engineers documents, and procedures for converting 24 hour precipitation volumes to any duration are included in the NOAA atlas referenced in this document. Usage of a 24 hour duration is well accepted for large watersheds; however, the area of this watershed is in a grey zone, in which regulation as well as engineering judgement defines accepted practice. It is recommended that the Department of Natural Resources be contacted regarding the accepted procedures for developing design durations for flood control measures. Any changes in peak flow determinations from HEC-1 will require changes in HEC-2 outputs which are used to determine the berm heights and rip-rap considerations of the berms in this study.

P. 6-9, Section 6.2.5. Why was the 100-year, 24-hour storm event used rather than the 100-year flood event? If the longevity/permanence is to be evaluated, the 100-year probably maximum flood event, at a minimum, should be evaluated for all of the proposed reclamation features including the repository, berms, wetland cells, and pond. ASARCO/ARCO should conduct this evaluation and present the results. Will the wetland treatment cells be scoured during the 100-year flood event?

P. 6-10, Section 6.3.1. One upper Anaconda waste pile is located at the head of an intermittent stream. This pile is in direct contact with the stream. Therefore, the statement "because these waste pile are not in contact with ground water or normal ...flows ...there is minimal risk of metals mobilization from these piles by ground or surface waters" is erroneous. Wastes should be moved so they are not in contact with surface or ground water. Also, it is unlikely that incident infiltration will all rapidly run-off the waste piles as suggested in this work plan. Infiltration prevention measures should be evaluated and implemented.

The existing waste pile slope of 1:8:1 is not relevant to what the regarded slope should be. The waste piles should be regraded so that they are permanently stable, conducive to revegetation and not subject to erosion.

P. 6-11, Section 6.3.2. It is highly unlikely that direct seeding of waste piles will produce viable plants and a 1.8:1 slope with 12 inches of growth medium will be highly susceptible to erosion. ASARCO/ARCO should re-evaluate their reclamation plans for these waste piles. Slope should be designed for permanence and prevention of erosion (i.e., 3:1). An 18" cover medium, rather than 12" should be used. Also, acid base accounting analysis should be conducted so that the appropriate revegetation technique can be employed. Consideration should be given to the root depth of species used for vegetation if a 12' growth medium is utilized and the waste below this medium is acidic.

P. 6-12, Section 6.3.3. The west toe of the northwest Anaconda waste pile should be set back far enough from the coulee so that there is no possible interaction between the 100 year flood event and the re-graded waste, rather than protecting the toe with rip-rap. Due to the small size of the waste pile and the noted depression within, any additional excavation should be minimal and associated costs more than offset by savings in rip-rap and geotextile liner costs.

P. 6-12, Section 6.4.1 - Repository Location and Configuration. The chosen location for the repository is questionable for the following reasons: 1) It is immediately

downgradient of the Mike Horse treatability test pond which potentially is a structurally unstable feature; 2) it is within 20' of Mike Horse Creek; 3) it is located in an area where several significant groundwater seeps have been noted; and 4) it is in a very steep and narrow drainage which receives significant snowfall and runoff. MDHES recommends that a different location be chosen for the repository site or that the wastes be stock piled and moved to a more desirable repository location upon completion of a land trade or land acquisition with the USFS. Other repository sites for 1994 should be evaluated. The Daylight and/or Sunlight claim areas may provide a suitable location.

P. 6-13, Section 6.4.1. There is minimal room for error (4,400 cy) in volume estimates for the repository (30,000 cy) especially since the presently estimated volume of the Anaconda waste pile (21, 800 cy) is lower than the previous estimate of 23,400 cy. The possibility of unanticipated wastes being uncovered during excavation is rather high, especially in light of discussions on pages 6-13 and 6-14 regarding buried concrete pipe, hydrocarbon tainted soil and the estimated volume discrepancies. The repository design should be flexible so that it allows for additional space, if needed.

P. 6-13, Section 6.4.1. Acid base accounting analysis should be conducted on the waste to be placed in the repository. Based on the results and final design of the repository, a determination should be made regarding the addition of lime to the waste. MDHES recommends addition of lime to the waste.

The wastes placed in the repository may <u>not</u> be isolated from conditions which promote leaching. Groundwater seeps along the northwest side of the natural slope into which the repository is to be built present a likely source of water and subsequent leaching. During excavation for the treatability pond <u>several</u> ground water seeps were present along the northwest slope. Also, the repository design has not been tested and proven for prevention of infiltration of water into the waste. It is premature to state that ".. use of... lime is not considered necessary ..." when potential leaching mechanisms have not been thoroughly evaluated.

P. 6-13, Section 6.4.2. Please send a copy of the field notes and analytical results for the test pit excavations to MDHES-Superfund as soon as possible.

P. 6-14, 2nd para. The presence of a spring beneath the Mike Horse waste pile (treatability pond) may increase the instability of this structure. As stated in MDHES' comments dated October 20, 1993, if built as designed, it is

recommended that all Mike Horse treatability structures be removed after the three year treatability test.

P. 6-14, 2nd para. One sampling episode in October is not adequate "flow data" to state that discharge was reduced as a consequence of the Mike Horse Creek diversion. The reduced flow could be a reflection of the time of year and recent precipitation events.

How will flow from the reinforced concrete pipe (RCP) be intercepted? What is the criteria for the assessment of requirement to convey pipe flow into the treatment system? When will this be completed?

P. 6-15, Section 6.4.3. The waste material contains boulder size fragments and cannot accurately be characterized as "a typical silty gravel material". Consequently, the analysis in this section is inaccurate and should be re-evaluated.

A seismic stability analysis should be conducted on the Mike Horse treatability pond.

P. 6-19, Section 6.4.4. Infiltration from groundwater seeps from the northwest hill needs to be considered. Several seeps have been noted, both in this document and from on-site overview of the adjacent treatment pond construction.

P. 6-22, Section 6.4.8. The proper storm duration (D) for estimating peak flow is the time of concentration (t_c), not 24 hours. This concern is far more important in this case than in the case of the Lower Anaconda Area (see Section 6.2) because the Mike Horse drainage area is so much smaller. The Rational Formula used here is not applicable unless D = t_c. Undoubtedly the rain intensity would be far greater for a 10 minute than a 24-hr storm. However, the intensity used (3.9 in/24 hr) is much higher than the anticipated 24-hr intensity (3.4/24 hr). What is the logic used here to determine intensity?

P. 6-25, Section 6.6.1. As mentioned in MDHES' comments on the treatability pond dated October 20, 1993, 3:1 pond side slopes would be more stable than 2:1 slopes proposed in the current design. For long-term adequate stability for the pond, 3:1 side slopes are recommended. Berm dimensions should <u>at least</u> conform to standard earth fill dimensions.

P. 6-25, Section 6.6.1. The slope stability analysis used is based on the pond material being "a well-graded sandy gravel with few fines." In reality there are <u>numerous</u> coarse gravels <u>and</u> boulders strewn throughout the waste rock pile.

Consequently, the stability analyses presented is erroneous and should be revised to reflect the true nature of the waste material.

P. 6-26, Section 6.6.2. The Mike Horse waste material is not a well-graded sandy gravel material as stated in the text. It is poorly-sorted waste including boulder size components.

P. 6.26, Section 6.6.2. How will the growth medium on the pond embankment act as an effect drain?

P. 6-31, Section 6.7.2. MDHES strongly encourages ASARCO/ARCO to install at least two monitoring wells, one down gradient of the pond and one down gradient of the repository. Based on the location of MHMW8, its ability to characterize groundwater from the pond and repository is questionable. MDHES would like to participate in the final well location selection(s).

P. 7-1, Section 7.1.1. This section states that the 18" RCP will be removed or plugged. Is the assumption that the RCP under the waste pile will remain in place and the remaining RCP will be excavated and removed.

P. 7-2, Section 7.1.1. MDHES recommends pretreatment pond 3:1 final grade side slopes.

P. 7-2, Section 7.1.2. After removal of the Anaconda waste, the remaining subgrade material should be sampled.

P. 7-4, Section 7.1.6. When will the addendum discussed in this section be prepared and submitted?

P. 7-9, Section 7.3.1. Groundwater monitoring should be conducted quarterly.

The following comments pertain to **Anaconda Mine and Mike Horse Mine Adit Discharges Identification of Remedial Actions and Work Plan For Implementation of Remedial Action:**

General Comments:

The language used throughout the Anaconda Mine and Mike Horse Mine Adit Discharges Work Plan suggests that wetland treatment of mine wastewaters is a proven and accepted technology. Wetland treatment of western metal mine acid mine drainage is experimental and has <u>not</u> yet been proven successful. As stated in the companion work plan titled "Upper Blackfoot Mining Complex Mike Horse Adit Drainage Treatability Study Work Plan," the oxidation pond and wetland treatment cells are a **treatability** study. In fact, ASARCO/ARCO and their consultants have verbally admitted that this technology is

still experimental and may fail at the UBMC. In the event that the wetland treatment system fails, ASARCO/ARCO are still responsible to effectively remediate surface water and groundwater contamination associated with historic mining practices at the UBMC. ASARCO/ARCO should include a plan for alternative treatment in the event that the proposed water treatment plan fails.

MDHES feels that the above points warrant a final revision (or insertion) of this work plan and strongly encourages ASARCO/ARCO to do so.

Specific Comments:

P. 2-3, 2nd para. The time of passage of the Clean Water Act has nothing to do with the remediation of the Upper Blackfoot Mining Complex.

P. 4-7, Section 4.2.1. How were the flow measurements made for Anaconda and Beartrap Creeks? These two drainages are of similar size and are located in a similar precipitation zone. The five-fold difference in peak flows presented in this work plan suggests that peak discharge could have been missed for Anaconda Creek. If this is the case, 100-year flood routing should be examined closely.

Watershed runoff yields likely exceed the five inches measured by the USGS due to the fact that the higher elevation of these upper drainages likely receive a greater amount of precipitation than the average for the entire Upper Blackfoot above "Pops Place." This should be considered in your plan.

Page 4-8, Section 4.2.2. It is unlikely that "significant metal contribution may be attributable to natural oxidation and mobilization processes in shallow and exposed ore bodies on-site." These ore bodies were only exposed at the surface (very limited air contact) and have had approximately 10,000 years to adjust. Unless the authors can give a site-specific reference, this statement should be deleted.

It is stated that the reduction in zinc concentrations is due to dilution and interaction with stream sediments. In light of the Mike Horse Creek precipitation analysis, it would appear that precipitation of zinc is one of the dominant reduction processes. The detection limits below which lead and cadmium concentrations apparently decreased should be stated in this discussion.

P. 4-11, Section 4.4.1.1. ASARCO/ARCO should include a discussion regarding the consequences of Mike Horse adit mine flows in excess of 100 gpm. In this discussion, ASARCO/ARCO

should include a contingency plan for the time periods when flow exceeds 100 gpm.

P. 4-11, Section 4.4.1.1. According to the old miners the source for the 300 level seep is a spring located within the Mike Horse waste pile.

P. 5-1, Section 5.1. For the record, this site is no longer a DSL site, but a State Superfund site. Under CECRA (Section 75-10-721) an environmental requirements, criteria, or limitations (ERCLs) analysis is required. An ERCLs analysis has not been completed by MDHES for the UBMC. ARARs are required under CERCLA not CECRA.

P. 5-3. Under CECRA (Section 75-10-701 (4)(a)), ASARCO and ARCO are responsible to remediate "any site or area where a hazardous substance has been deposited, ... or otherwise come to be located." Consequently, ASARCO/ARCO are responsible to remediate impacts anywhere in the environment which are from past mining activities associated with ASARCO/ARCO historic mining activities. The statement "..that should be addressed by the remedial options developed .. include - The Upper Blackfoot River on ASARCO's property" is inaccurate and should be revised.

P. 5-5, Section 5.1. The use of biocides will remain an option and should not yet be eliminated from further evaluation.

P. 5-7, Section 5.1. Alternative 2: Wetland Treatment is misleading. Wetlands <u>may</u> have the potential for effective metal treatment, but such potential has <u>yet</u> to be demonstrated in practice for the type of scenario at the UBMC. The statement "constructed wetland treatment systems have been demonstrated to provide effective removal potential of metals from wastewaters" is misleading. This statement is true for <u>wastewaters</u> (i.e., municipal and agricultural), not acid mine drainage from precious or base metal deposits. Also, EPA has acknowledged the <u>potential</u> for effective metal treatment at the Bunker Hill site; however, it should be mentioned that the State of Idaho has not signed the record of decision because this technology has not yet been demonstrated to be successful.

The discussion of Alterative 2 should also include the fact that the Montana Abandoned Mines Bureau no longer uses wetlands for treatment of acid mine drainage due to the widespread failure of these systems in this region.

"Overall treatment efficiency of a full-scale wetland treatment system is expected to be comparable to conventional

chemical treatment." This statement may be true for other types of wastewaters, but this technology has yet to be proven for treatment of mineral mine wastewater in the western United States. The statement used in this context is misleading.

P. 5-9, Section 5.2. Comments on the voluntary interim remedial actions submitted by the State in no way infer State acceptance of ASARCO/ARCO's chosen remedial actions. The discussion presented on project acceptance is misleading. The State has not accepted ASARCO/ARCO's chosen remedial action. In fact, the State views the settling pond and wetland treatment cells as a treatability study and not a remedial action.

P. 5-12, Section 5.2.5. The fact that the Mike Horse treatability pond has been partially constructed does not serve as a basis for choosing Alternative #3.

P. 6-2, Section 6.1.1. If the initial surface flow cell fails to remove nearly all the oxidized iron/aluminum from the flow, the subsurface flow cell downstream is doomed to failure by plugging.

P. 6-9, Section 6.2.2.2. Why is the Anaconda Creek crossing not being designed for high water flows?

P. 6-10, Section 6.3.1. Whether or not the Mike Horse stream diversion has decreased the amount of flow emanating from the underground workings cannot be determined by one sampling event in October 1993. The reduction in flow from the Mike Horse adit could merely reflect a reduction in precipitation during the period and the time of year. As stated in the MDHES' comments dated October 20, 1993, selection of 40 to 100 gpm as the design flow rate is questionable. Due to the lack of data and unknown flow reduction, the design flow should be increased.

P. 6-12, Section 6.3.1. It is inadvisable to place the sludge dewatering beds in the vicinity of the waste repository (especially on top of the repository) as the water could infiltrate into the repository creating water quality problems or slope stability problems. This is also true for the proposed tailings dam drying beds location.

Also, if pure strain westslope cutthroat trout exist above the Beartrap Creek tailings pond, it would not appear advisable to use this "beach" as a drying bed.

P. 6-13, Section 6.3.2. The pipeline from the Mike Horse pretreatment pond to the wetland treatment cells will generate significant head as described elsewhere in this document.

This head could be used to entrain oxygen into the flow at the first surface treatment cell and thus increase the efficiency of iron removal.

P. 6-21, Section 6.3.4.1. Evaluation of additional liners would be appropriate. Why isn't an impermeable geosynthetic liner material being considered for the wetland treatment cell? A low-permeability liner proposed in this plan may allow contamination of the subsurface material, which would likely result in groundwater contamination.

P. 6-22, Section 6.3.4.2. Uneven distribution of flow across the distributor pipe has been a problem in some wetlands. It is suggested that tee branches on approximately 3-5 ft centers, tightly fitted but not glued, be used. This design will help to distribute the water across the wetland. Should differential settlement occur, flow distribution could easily be modified by adjusting the pitch of each individual tee, rather than disturbing the wetland by re-leveling the distributor pipe. Also, it is suggested that the distribution and collection pipes in the cells be provided with a means for cleaning.

P. 6-24, Section 6.3.5. This section should include a brief discussion regarding the design of this wetland cell that theoretically will prevent freezing during the winter months. All of the DSL wetland cells have encountered problems with freezing during the winter.

P. 6-33, Section 6.6.3. The flow metering system should be designed to prevent freeze-up. For accurate evaporation data, the evaporation pan at the Mike Horse treatment pond should be "floated" in the pond. There are a number of simple, dependable systems for doing this.

The shallow piezometers in the wetland cells <u>will</u> freeze and should be constructed with this in mind. "Lip-on" caps should be avoided as shallow piezometers can be literally pulled out trying to remove this type of cap.

P. 6-34, Section 6.7.2. Please submit a copy of the construction drawings to MDHES-Superfund prior to or during solicitation for bid.

Appendix A, Passive Treatment in Constructed Wetlands. This discussion is misleading, as it inaccurately insinuates that passive treatment of <u>mine</u> (acid mine drainage from precious and base metal deposits) in constructed wetlands is a proven technology. In reality, constructed wetlands for this type of <u>mine</u> wastewater treatment have had mixed results and are still experimental in nature.

MDHES is looking forward to receiving a copy of ASARCO/ARCO's response to agency and public comment on these documents. If you have any questions, or would like to discuss these comments further, please do not hesitate to call.

Sincerely,

Judy Reese

Judy Reese
Environmental Scientist

Encl.

cc: MDHES - Bassein, Bugosh, Phillips
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